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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/691,434	08/02/96	YAMAZAKI S	0756-1551

MM91/0829

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EXAMINER	
WILCZEWSKI,M	
ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 08/29/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 08/691,434	Applicant(s) Yamazaki et al.
	Examiner M. Wilczewski	Group Art Unit 2822

☒ Responsive to communication(s) filed on *May 15, 2000*.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *three* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *16-20, 24, 25, 56-61, and 74-91* is/are pending in the application.

Of the above, claim(s) ____ is/are withdrawn from consideration.

☐ Claim(s) ____ is/are allowed.

☒ Claim(s) *16-20, 24, 25, 56-61, and 74-91* is/are rejected.

☐ Claim(s) ____ is/are objected to.

☐ Claims ____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on ____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on ____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☒ received in Application No. (Series Code/Serial Number) *08/160,909*.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: ____.

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). *46*

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Continued Prosecution Application

The request filed on May 15, 2000, for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 08/691,434 is acceptable and a CPA has been established. An action on the CPA follows.

The indicated allowability of claims 16-20, 24, 25, 56-61, and 74-91 is withdrawn in view of the newly discovered reference to Kawachi et al., the article entitled "Large-Area Process for Fabrication of Poly-Si Thin Film Transistors Using Bucket Ion Source and XeCl Excimer Laser Annealing". Rejections based on the newly cited reference(s) follow.

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 08/160,909, filed on February 18, 1994.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 16-20, 24, 25, 80 and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begin et al. in view of Miyachi et al., Nakayama et al., and Kawasaki et al., further in view of Codama et al., all of record, further in view of Pressley, U.S. Patent 4,475,027, further in view of Kawachi et al., the article entitled "Large-Area Process for Fabrication of Poly-Si Thin Film Transistors Using Bucket Ion Source and XeCl Excimer Laser Annealing", newly cited.

Begin et al. disclose an apparatus for processing semiconductor wafers which includes satellite reaction chambers 60, 62, 64, and 66 disposed around the periphery of central chamber 14, see figure 1. A robot assembly 16 comprising arms 18, 20, and 22 is disposed in central chamber 14. Assembly 16 moves the substrate 12 to any position within the apparatus. Begin et al. lack anticipation only of disclosing that reaction chambers 60, 62, 64, and 66 comprise an ion introducing apparatus and a laser processing apparatus. However, apparatuses

used for irradiating an amorphous silicon layer for dehalogenating and hydrogenating the layer, etching, and plasma doping are well known in the art, see Miyachi et al., Kawasaki et al., and Nakayama et al., respectively.

Miyachi et al., in particular, disclose an apparatus which comprises a film-forming chamber 1 for forming an amorphous semiconductor film and a dehalogenating-hydrogenating chamber 2, see figure 5, for example. The two chambers are combined by a conveying device 13. The substrates 10 move between the two chambers without being exposed to outside air. Note in Example 14 that the dehalogenation-hydrogenation is preferably performed by light irradiation using, for example, an ultraviolet laser, a visible light laser, or a carbon dioxide laser, see column 18, lines 29-43. Miyachi et al. lack anticipation only of using a rectangular-shaped laser beam having an elongated cross-section and of moving the substrate in a direction orthogonal to the laser beam during the irradiating step.

Pressley discloses an laser processing apparatus which comprises a rectangularly-shaped laser beam in which the laser beam is scanned by moving the beam relative to the substrate, see column 7, lines 4-9. Since the apparatus of Pressley permits uniform laser irradiation of semiconducting materials, it would have been obvious to one of ordinary skill in the art to use a laser beam having a rectangular cross-section in the dehalogenating-hydrogenating chamber of Miyachi et al. In addition, it is obvious from the teachings of Pressley that the substrates could be alternatively moved with respect to the laser beam in the known apparatus of Miyachi et al.

Codama discloses a method of fabricating a thin film transistor which includes the steps of depositing an amorphous silicon layer; etching the silicon layer, the gate layer and the gate insulating layer; plasma doping the silicon layer to form source and drain regions, see column 1, lines 42-46; and hydrogenating the silicon layer. Therefore, in light of the semiconductor device manufacturing process of Codama, it would have been obvious to the skilled artisan to include a laser processing apparatus and an ion introducing apparatus in the known multi-chambered apparatus of Begin et al. in order to fabricate the thin film transistor of Codama.

Although Codama teaches plasma doping of a semiconductor film, Codama fails to anticipate the use of an ion introducing apparatus comprising a grid electrode around which a dopant is made a plasma and accelerated toward the semiconductor layer. However, a plasma doping apparatus which comprises a grid electrode is known in the art, as taught by Kawachi et al., see Fig. 1. In addition, Kawachi et al. teach the activation of the implanted ions by laser annealing. Since Kawachi et al. teach that the disclosed ion introducing apparatus is applicable to polycrystalline thin film transistors and permits large-area implantation, it would have been obvious to one skilled in the art to include the ion introducing apparatus of Kawachi et al. in the known multi-chambered apparatus of Begin et al. in order to perform large-area doping or polysilicon in the fabrication of the device of Codama. Since Kawachi et al. teach laser annealing of the dopants implanted using the disclosed large-area doping apparatus shown in Fig. 1, it would have been obvious to the skilled artisan to include the ion introducing apparatus of Kawachi et al. in a multi-chambered apparatus that includes a laser irradiation chamber.

Claims 56-61, 81 and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begin et al. in view of Miyachi et al., Nakayama et al., and Kawasaki et al., further in view of Codama et al., all of record, further in view of Hashizume, JP 03-286518, further in view of Kawachi et al., the article entitled "Large-Area Process for Fabrication of Poly-Si Thin Film Transistors Using Bucket Ion Source and XeCl Excimer Laser Annealing", newly cited.

Begin et al. disclose an apparatus for processing semiconductor wafers which includes satellite reaction chambers 60, 62, 64, and 66 disposed around the periphery of central chamber 14, see figure 1. A robot assembly 16 comprising arms 18, 20, and 22 is disposed in central chamber 14. Assembly 16 moves the substrate 12 to any position within the apparatus. Begin et al. lack anticipation only of disclosing that reaction chambers 60, 62, 64, and 66 comprise an ion introducing apparatus and a laser processing apparatus. However, apparatuses used for irradiating an amorphous silicon layer for dehalogenating and hydrogenating the layer, etching, and plasma doping are well known in the art, see Miyachi et al., Kawasaki et al., and Nakayama et al., respectively.

Miyachi et al., in particular, disclose an apparatus which comprises a film-forming chamber 1 for forming an amorphous semiconductor film and a dehalogenating-hydrogenating chamber 2, see figure 5, for example. The two chambers are combined by a conveying device 13. The substrates 10 move between the two chambers without being exposed to

outside air. Note in Example 14 that the dehalogenation-hydrogenation is preferably performed by light irradiation using, for example, an ultraviolet laser, a visible light laser, or a carbon dioxide laser, see column 18, lines 29-43. Miyachi et al. lack anticipation only of using a rectangular-shaped laser beam having an elongated cross-section and of moving the substrate in a direction orthogonal to the laser beam during the irradiating step.

Hashizume discloses a laser processing apparatus which comprises a laser beam having a rectangular shape in which the laser beam is scanned by moving the beam relative to the substrate, see figure 2 and pages 7-9 of the translation. Note in figure 4, Hashizume shows that a rectangular-shaped laser beam having a width greater than a "substantially" square substrate is scanned along the substrate surface. The use of a rectangularly-shaped laser beam, as in the method of Hashizume, eliminates overlapping regions and permits uniform irradiation of the silicon layer, see page 7 of the translation. Since the rectangular-shaped laser beam of Hashizume permits uniform laser irradiation of semiconducting materials, it would have been obvious to one of ordinary skill in the art to use a laser beam having a rectangular cross-section in the dehalogenating-hydrogenating chamber of Miyachi et al. In addition, it is obvious from the teachings of Hashizume that the substrates could be moved with respect to the laser beam in the known apparatus of Miyachi et al. It is noted that Hashizume does not disclose the dimensions of either the substrate or laser beam, however, in light of the generic teaching of Hashizume to use a rectangularly-shaped laser beam having a width greater than that of the irradiated substrate, these dimensions are not deemed to patentably distinguish the claimed

method from that of Hashizume. In addition, Hashizume discloses a laser beam scanning technique, however, it would have been obvious to one of ordinary skill in the art that, alternatively, the substrate could be moved with respect to the laser beam.

Codama discloses a method of fabricating a thin film transistor which includes the steps of depositing an amorphous silicon layer; etching the silicon layer, the gate layer and the gate insulating layer; plasma doping the silicon layer to form source and drain regions, see column 1, lines 42-46; and hydrogenating the silicon layer. Therefore, in light of the semiconductor device manufacturing process of Codama, it would have been obvious to the skilled artisan to include a laser processing apparatus and an ion introducing apparatus in the known multi-chambered apparatus of Begin et al. in order to fabricate the thin film transistor of Codama.

Although Codama teaches plasma doping of a semiconductor film, Codama fails to anticipate the use of an ion introducing apparatus comprising a grid electrode around which a dopant is made a plasma and accelerated toward the semiconductor layer. However, a plasma doping apparatus which comprises a grid electrode is known in the art, as taught by Kawachi et al., see Fig. 1. In addition, Kawachi et al. teach the activation of the implanted ions by laser annealing. Since Kawachi et al. teach that the disclosed ion introducing apparatus is applicable to polycrystalline thin film transistors and permits large-area implantation, it would have been obvious to one skilled in the art to include the ion introducing apparatus of Kawachi et al. in the known multi-chambered apparatus of Begin et al. in order to perform large-area doping or polysilicon in the fabrication of the device of Codama. Since Kawachi et al. teach laser annealing

of the dopants implanted using the disclosed large-area doping apparatus shown in Fig. 1, it would have been obvious to the skilled artisan to include the ion introducing apparatus of Kawachi et al. in a multi-chambered apparatus that includes a laser irradiation chamber.

Claims 74-79, 82-85, and 89-91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begin et al. in view of Miyachi et al., Nakayama et al., and Kawasaki et al., further in view of Codama et al., all of record, further in view of Kawachi et al., the article entitled "Large-Area Process for Fabrication of Poly-Si Thin Film Transistors Using Bucket Ion Source and XeCl Excimer Laser Annealing", newly cited.

Begin et al. disclose an apparatus for processing semiconductor wafers which includes satellite reaction chambers 60, 62, 64, and 66 disposed around the periphery of central chamber 14, see figure 1. A robot assembly 16 comprising arms 18, 20, and 22 is disposed in central chamber 14. Assembly 16 moves the substrate 12 to any position within the apparatus. Begin et al. lack anticipation only of disclosing that reaction chambers 60, 62, 64, and 66 comprise an ion introducing apparatus and a laser processing apparatus. However, apparatuses used for irradiating an amorphous silicon layer for dehalogenating and hydrogenating the layer, etching, and plasma doping are well known in the art, see Miyachi et al., Kawasaki et al., and Nakayama et al., respectively.

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chamber 2, see figure 5, for example. The two chambers are combined by a conveying device 13. The substrates 10 move between the two chambers without being exposed to outside air. Note in Example 14 that the dehalogenation-hydrogenation is preferably performed by light irradiation using, for example, an ultraviolet laser, a visible light laser, or a carbon dioxide laser, see column 18, lines 29-43. Miyachi et al. lack anticipation only of using a rectangular-shaped laser beam having an elongated cross-section and of moving the substrate in a direction orthogonal to the laser beam during the irradiating step.

Codama discloses a method of fabricating a thin film transistor which includes the steps of depositing an amorphous silicon layer; etching the silicon layer, the gate layer and the gate insulating layer; plasma doping the silicon layer to form source and drain regions, see column 1, lines 42-46; and hydrogenating the silicon layer. Therefore, in light of the semiconductor device manufacturing process of Codama, it would have been obvious to the skilled artisan to include a laser processing apparatus and an ion introducing apparatus in the known multi-chambered apparatus of Begin et al. in order to fabricate the thin film transistor of Codama.

Although Codama teaches plasma doping of a semiconductor film, Codama fails to anticipate the use of an ion introducing apparatus comprising a grid electrode around which a dopant is made a plasma and accelerated toward the semiconductor layer. However, a plasma doping apparatus which comprises a grid electrode is known in the art, as taught by Kawachi et al., see Fig. 1. In addition, Kawachi et al. teach the activation of the implanted ions by laser annealing. Since Kawachi et al. teach that the disclosed ion introducing apparatus is applicable to

polycrystalline thin film transistors and permits large-area implantation, it would have been obvious to one skilled in the art to include the ion introducing apparatus of Kawachi et al. in the known multi-chambered apparatus of Begin et al. in order to perform large-area doping or polysilicon in the fabrication of the device of Codama. Since Kawachi et al. teach laser annealing of the dopants implanted using the disclosed large-area doping apparatus shown in Fig. 1, it would have been obvious to the skilled artisan to include the ion introducing apparatus of Kawachi et al. in a multi-chambered apparatus that includes a laser irradiation chamber.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Wilczewski whose telephone number is (703) 308-2771.

M. Wilczewski
Primary Examiner
Tech Center 2800

MW

August 27, 2000